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ABSTRACT

This paper reports the results of a two-part qualitative study into student strategies for learning in distance learning courses offered at Teachers College, Columbia University. Verbal Protocol Analyses was used to gather information on the cognitive strategies students used to solve problems encountered as they navigated through the site. A semi-structured interview was also conducted with participants to gain insight into student attitudes and perspectives on learning in the online environment. The theoretical framework of Activity Theory was used to develop a deeper understanding of the systemic roots of tensions in the online classroom environment. Conclusions include suggestions for specific teaching practices and design solutions to alleviate these tensions. (Contains 20 references.) (Author/AEF)

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Distance Learning and Student Strategies

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Abstract

This paper reports the results of a two-part qualitative study into student strategies for learning in distance learning courses offered at Teachers College, Columbia University. Verbal Protocol Analysis was used to gather information on the cognitive strategies students used to solve problems encountered as they navigated through the site. A semi-structured interview was also conducted with participants to gain insight into student attitudes and perspectives on learning in the online environment. The theoretical framework of Activity Theory was used to develop a deeper understanding of the systemic roots of tensions in the online classroom environment. Conclusions include suggestions for specific teaching practices and design solutions to alleviate these tensions.

Introduction

Online education is a relatively new phenomenon, which is increasingly seen by institutions and educators as a viable alternative to the traditional face-to-face class. Past research into online education has focused primarily on media comparison studies. These studies have generally resulted in a 'no significant difference' finding, which Lockee, Burton and Cross (1999) have criticized as useless research, "...failure to reject the null hypothesis means just that and nothing more; just as a legal finding of not guilty does not mean innocent." (Lockee et al. p. 38). Studies that rely on comparing achievement on classroom assessment measures between in-person courses and online courses tell us nothing about the actual effect of the distance learning media on the experience of the individual learner. McIsaac and Gunawardena (1996) recommend that future research focus, in part, on "Examin[ing] the characteristics of the distance learner and investigat[ing] the collaborative effects of media attributes and cognition" (p. 431).

The need for further and more focused research was reiterated by Harasim (1996) who claimed that it was no longer necessary to prove the viability of educational computer networking; rather, further research should study the learning processes in online environments and "the patterns of human interaction in decision-making, problem-solving, and knowledge building."

Therefore, this qualitative study departs not with the goal in mind of trying to prove or disprove the effectiveness of the online medium, but rather from the assumption that the Internet is a viable delivery mechanism, and the design of Internet-based programs needs to take into account the processes and strategies used by the learner in order to increase effectiveness.

Methodology and Analytic Framework

This pilot study used a grounded theory approach (Glaser and Strauss, 1967) to qualitative research in order to find patterns and strategies for learning that emerge from the learner's perspective, using the process of sorting, coding and comparing the data collected in interviews and observations of students enrolled in online courses through Teachers College Distance Learning Project (DLP). Two online platforms are used in the DLP, Blackboard and Prometheus. These commercial educational web site templates provide a course structure for teachers as well as communications tools to facilitate interaction.

Engstrom's Activity Theory model was used as the framework for analyzing student behavior in the online environment. Theoretical propositions concerning the components of successful online course design emerged from careful analysis of (i) the behaviors and attitudes students demonstrate as they move through their online course; (ii) the level of interaction between the learner and the different aspects of the online course; (iii) the steps and decisions that the learner makes while navigating the course site.

Procedures

Using a technique known as Verbal Protocol Analysis (VPA), based on Ericsson and Simon's "Thinking Aloud Processes" (1993:78), the participants were instructed to verbalize their thoughts as they navigate through the course web site. This process was captured on videotape by placing the camera behind the participant and focusing

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on the computer screen, while a microphone recorded the speech. The purpose of the verbal protocol analysis was to observe what actually happens when students participate in an online course, and to reveal—as they happen—the points at which students make decisions which will potentially affect their learning experience. During a semi-structured interview, the participants were asked to reflect more deeply on their actions as exhibited during the VPA task.

The think-aloud technique requires the participant to verbalize her thoughts as she works through a cognitive task. The procedure is designed to reveal the cognitive processes the participant is undergoing as she performs the task. Social verbalization includes explanation and description of one's thoughts while performing a task. Social verbalization is distinct from think-aloud through the addition of explanatory and descriptive elements. In order to minimize the amount of social verbalization and maximize the think-aloud activity, the researchers executed the following procedure as outlined by Ericsson and Simon (1993):

> First the experimental situation is arranged to make clear that social interaction is not intended, and the experimenter is seated behind the subject and hence is not visible. The "think-aloud" instruction explicitly warns the subjects against explanation and verbal description. Second, after the instruction is presented, the subjects are given practice problems in which it is easy to verbalize concurrently and from which they attain familiarity with the normal content of think-aloud verbalizations (p. xiv).

The participants were instructed to verbalize their own thoughts; they were told not to explain anything to the researchers and that in fact there would be no interaction during the think-aloud unless the participant grew quiet, at which point the researcher would prompt the participant to "keep talking." The participants were given a math problem and a language problem to solve (Appendix A), as a way to practice the think-aloud technique. The think-aloud procedure is difficult for individuals to execute. According to Ericsson and Simon (1983) "When an investigator instructs a subject to think-aloud, some subjects may misunderstand the instruction and produce instead the more common social communication, explaining or describing the process to the experimenter" (p. xiv). The participants in this study produced both social communications, explaining and describing the web site to the researchers, and true think-aloud verbalizations. However, the information that was received from the participants is rich data, which reveals much about the online educational experience for them.

After the think-aloud section of the experiment, brief interviews were conducted with each participant. The interview sought to uncover further information about the approaches to learning the participant employed in the online course. The interview also posed questions about the social aspects of the experience.

Sample

A total of four participants took part in this pilot study. The participants voluntarily took part in the study and they represent a convenience sample of students taking online courses at Teachers College in the spring, 2001 semester. The four students were all enrolled in different courses. The results of the study are not generalizable to a larger population and serve mainly to provide insight into the experience of the individual participants. Table 1 contains the ethnographic and questionnaire data obtained from the participants. Participant names are fictitious.

Table 1

Participant	Degree Program	Age	Sex	Ethnicity	How many online courses have you taken (including this one)?
Karen	MA Sociology & Education	30	F	White/Latina	One
Myriam	Ed.M. International Ed.	32	F	Latina	One
Ann	MA Sociology & Education	25	F	White	One
Jean	Not enrolled in Degree Prog.	48	F	White	Two

Findings

Several important themes emerged from the analysis of the transcripts including: web site design flaws; the use of cognitive strategies and coping strategies; the effects of virtuality; and the effects of learning differences in the online classroom. These themes have important implications for future design on online learning environments, and each theme on its own could be the focus of future research.

Web Site Design Flaws

Each participant expressed some confusion regarding orientation to the organization of the class and the flow of the syllabus. The participants attributed this confusion to the instructor's layout of the course materials in the online environment. Ann experienced the most bewildering design of all four participants. The online course she took used three different web sites, with three separate URLs to convey the subject matter (Professor's self-created web site), conduct the online discussions (Prometheus platform) and hold the synchronous chats (Blackboard platform). During the think-aloud section Ann made mention of the difficulty in navigating through the various sites associated with the course six times. The Professor's self-created web site was particularly frustrating for Ann. Among the many navigational problems with this web site, the Professor used a moving JavaScript window as a menu bar. This box moved down the page as the viewer scrolled down, obscuring parts of the web site that the viewer wished to see. In the interview section Ann expressed the desire for a more transparent design. "I wish they all would have been on the same web site. I wish there would have been like a way to directly link between. It took me a long time just to remember the names [URL's]." This course design was a source of frustration for Ann, which unnecessarily interfered with the learning experience.

Karen also experienced confusion and frustration with the layout of the course. The course Karen took was presented using the Blackboard platform. Karen stated during the think-aloud, "but this is where its really confusing because, I'm here and this is called equity, this week's called equity, but if you go back to course documents where it gives us the readings to prepare for class you don't see anything listed as equity." As Karen made this comment she was jumping back and forth between the *Communications* section of the site and the *Course Documents* section of the site in an attempt to figure out which discussion topic corresponded with the current week's readings. The lack of consistent labeling between the course documents section topic listings and the corresponding discussion forum in the communications section was a design flaw that caused problems for Karen. To cope with the disorientation she described, Karen developed the strategy of referring to the contents of the student discussion for clues as to what the current topic of study was.

Use of Cognitive and Coping Strategies

Karen used this strategy—referring to the work of other students—to solve problems she encountered in the online environment, for both organizational and educational purposes. Karen scaffolded her own comprehension of assigned texts by first reading the comments of others in the discussion board which referred to these assigned readings. "I would usually go and read what other people have written and then go actually do my reading for the week" and "I usually read them [other people's comments on the discussion board] so I kinda have an idea of what people are talking about before I do my reading." This strategy provided Karen with a meaningful overview of the material to be read. The focus of the conversation in the discussion forum alerted Karen to the nature of the content of the material to be read and to what her fellow students found most noteworthy as a topic of discussion within the readings. This strategy is akin to the notion of advance organizers postulated by Ausubel et al. (1978). As Driscoll (1994) summarizes, "Advance organizers are relevant and inclusive introductory materials, provided in advance of the learning materials" (p. 126).

Each of the participants in this pilot study mentioned their own referral to other student's work as a method of learning in the online environment. Ann and Karen were both enrolled in theoretical courses. Ann reported during the think-aloud "If I don't understand the question from over here, sometimes I go in and find out what other people have written about it." Ann's strategy is similar to Karen's; that is, the thoughts of classmates are used to scaffold reading assignments and gain clarification on the topic question at hand.

Myriam and Jean were both taking design courses. They would look at other student's design ideas to help spark their own creative imaginations. Myriam remarked:

> I'm learning from my classmates in terms of...when I know there is an assignment going on or something, in the process of doing it, I check what they [the other students] have been doing so I learn from that 'oh wow that's a good idea.'

Likewise, Jean mentions, "I want to look at other students work. This is work I've not done yet. I may just get an idea."

It is possible that Karen and Ann could apply their strategies in a face-to-face class; they could listen to the class discussion of the readings for the week and then do the readings subsequent to the class. However, the online environment provides a concrete and consistent source of student input. Moreover, it is highly unlikely that Myriam and Jean could have access to fellow student's designs in a face-to-face class. This is a unique affordance of the online course for Myriam and Jean.

Another strategy that was deployed by all of the participants was the coping strategy of printing out course materials (such as lecture notes and electronic texts) to read off-line. The commonly used cognitive strategies of highlighting, underlining or otherwise denoting important sections of a text are not readily available in a computer-based environment. Both Jean and Ann expressed the desire for a highlighting tool that would allow them to take notes in an electronic text the way they normally would with pen and paper. According to Ann "It's kind of strange reading text on the screen as opposed to reading books. It's harder to go back and there's not the ability to highlight and underline and figure stuff out, which is what I'm used to doing."

These actions showed that students are coming up with strategies to cope with the unfamiliar attributes of this new learning environment, and even discovering new ways to learn their course materials as a result. Thus it is useful to differentiate between 'learning strategies' (advanced organizing), and 'coping strategies' (printing course readings) as two observable types of behavior. The former can be described as a deliberate action that contributes to learning the course content, but which may be the same as a strategy used in face-to-face courses. The latter, a coping strategy, is an action exhibited by the participants that is used to compensate for an unfamiliar and unique attribute of the online experience. In many cases an action could be both a coping and a learning strategy, or more importantly, the coping strategy often becomes that which contributes to learning the course content. We will see other examples of learning and coping strategies throughout our findings.

Effects of Virtuality

The fact that one is not able to utilize well-known cognitive strategies in the online environment is a negative effect of virtuality. The virtual nature of the online course gives it certain characteristics not found in a face-to-face class. Freed from temporal and spatial boundaries, the online course may be accessed at anytime, from any location. Social interaction in the virtual environment is largely relegated to textual exchanges on the discussion board, in the chat room or through email. Body language, eye contact and physical appearance are communicative modes not available in the online course. These aspects of virtuality have an effect upon the student experience. The participants reported both positive and negative effects of virtuality. The synchronous chat was Ann's favorite aspect of the online learning experience. Ann emphasized the way the chat format allowed her to have more participation in the class due to the suspension of the "social rules" at work in the face-to-face classroom.

> [T]here's something about getting up and speaking forth your idea – which you're not even sure [of] because you are still formulating – in front of people that is scary, that is intimidating, especially if you don't feel like you know the people in the class, have a good rapport with everyone. Whereas the first evening of the chat it took a little bit for me to jump in there and put forth my ideas, but it was fine after that, and once I felt like I had a place in the conversation, it was a lot easier to talk.

Ann found the "organic, nonlinear" nature of discussion in the synchronous chat room to be a compelling learning activity:

> It's amazing what a different kind of activity the learning process is, because you are constantly having all these conversations with people um and that – you have to jump in, you have to participate – you can't just sit back. People respond to a thread and then another thread develops from it and then its more organic, it's a lot less linear.

Moreover, the dilemma posed by 'having to jump in' to a synchronous chat turned into an opportunity for Ann to learn the content better, because she began preparing for her chat by reading and reviewing her course materials in detail before the chat session. This is an example of a coping strategy that becomes a learning strategy as well.

Interestingly, it is the lack of proximity that allowed Ann to feel more confident in the class. She felt like she got to know the students in the online class in a way that she seldom did in a face-to-face class: "You have a

sense of people who have similar ideas, you have a sense of people, what people's interests are, I feel probably that I know people in the class better than I would know people in a regular class."

However, lack of proximity was also the major negative effect of virtuality cited by the participants. The feeling of isolation and the lack of getting to know the Professor and the other students in the class was a common issue. Myriam remarked: "I feel that I'm like maybe too much by myself. I don't like that part. I don't feel like I have that much feedback and I'm sometimes I feel like I am lost."
Jean also mentioned that she did not like interacting by e-mail and that she missed the "spontaneous" nature of face-to-face communication. "Personality wise I like to see faces, you know. I move my hands when I talk. It's easier. You are more spontaneous when you interact directly. I think it is difficult to interact by e-mail." Even Ann noted that she made a point to go by the Professor's physical office in order to meet him. "I actually went by and introduced myself to him because I thought it was kind of strange to be taking the course without ever having set eyes on him."

Karen expressed the most difficulty with the effects of virtuality. The collapse of time and space boundaries manifested in the anytime, anywhere nature of the online class was a very troubling aspect for her. She consistently lamented the lack of face-to-face elements in the online class. Her dissatisfaction with the online experience seemed to be inversely proportional to her expectation that this modality would be similar to a traditional face-to-face class. In both the think-aloud section of the session and the interview section, Karen implicitly and explicitly expressed confusion, frustration and difficulty with both the collapse of time and space boundaries and the virtual aspect of the online environment.

> Like the week starts on Sunday, so these classes are actually seven days a week, whereas I'm used to thinking of school between like Monday and Friday. It's like this, people post on the week-ends so it's just even more work it's just : it's like its ongoing it's never complete.

Karen further explicated this sense of feeling overwhelmed in the following passage:

> [P]eople add new ones [comments to the discussion forum] after that week is over, which is confusing for me. Because like : 'classroom community' was, you know, three weeks ago and: there's 47 new [comments on the discussion topic], and that week I read them all, but like what are people still talking about?

Karen's frustration with the ongoing nature of the discussion in the online classroom revolves around the extra amount of work entailed in keeping up with several discussions.

> It's like by the time we get down to the end of this class we're gonna have to read everything it's gonna take like hours to go through and read everyone's responses and how responsible are we supposed to be for all of this? In a normal class you just go each week and the topic would be equity and you only have to be responsible for that.

The fact that students can access the conversation at any time during the week and the fact that they could still contribute to the conversation after the class had moved on to the next topic is a crucial difference in the online and face-to-face experiences. The opportunity to read and re-read comments in the student discussion board creates a whole new learning opportunity for students in the virtual classroom, but they must first learn to abandon their previous temporal and spatial notions of classroom learning.

In the interview section of the session, when asked how she approached learning in the online course, Karen responded "Well, I try to fit it into the schema that I think of as a normal class. And it doesn't really seem to fit." The fact that Karen came to the online class with the traditional face-to-face class schema is a deducible one. Few students at this point in time have much experience with online education, so the primary conception of class is the traditional face-to-face mode.

In line with this schema, Karen expresses her preference for the proximal pleasures of the face-to-face experience. "I like going to class, I like listening to discussions, I like being in the room having that moment in time with a group of people discussing ideas." She also expresses her frustrations with the virtual nature of the online class. "I feel like I'm faking the class, I don't feel like I'm really taking it. I mean I'm doing the readings, but its such an isolated experience." The lack of proximity appears to result in less meaningful learning for Karen:

> Whereas when, online I might be reading twelve comments in a row and so your click, click, click commenting. I forget what the other people said and it kind of starts to blend together. Whereas, when your in class you see the person who said it and that's what you want to remember, even though three more comments come in between you might go back and say I remember what Susan said blah blah blah blah blah. Because she's right there, its in the moment, its an interaction.

It is possible that Karen uses visual cues to encode new information. In a discussion of human memory and retrieval Anderson (1995) explicates various contextual cues individuals use to encode information. Karen seems to use the visual cue of other speakers' physical appearance to help her encode information in a class. The comment above implies that by remembering who spoke, Karen also remembers what it is the person said. Therefore, the lack of such visual cues in the online environment could prove to be a true impediment to cognitive functioning for Karen.

Jean also sited the lack of visual presence and identification of her classmates as an issue, but one that she was able to cope with by making connections between students' personal profiles and their course participation. For her it wasn't enough to read only the names of those participating in the discussions, or what they had to say. She needed to find out who they were, what they did for a living, and construct a personality with the available clues. These included not only the personal information students posted about themselves online, but also their style of writing and project participation. While looking at her classmate's projects, Jean remarked "You can really see the personality of the student, the way I imagine him" and "He likes to be funny, this Mark."

This value placed on getting to know the other students was also a coping strategy used to compensate for the lack of face-to-face interaction as found in the on-campus course. Jean knows that there are other people who are experiencing the course and working on the assignments just like she is. By recalling personal facts about each classmate as she reads their work, Jean is able to synthesize otherwise disjointed bits of information into a coherent set of content, thus her coping strategy also contributes to the learning process.

Learning Differences

Karen is a student in a degree program at Teachers College, and she comes to campus regularly for courses. It happened that this course wasn't offered on campus this semester, so she had to take it online. The fact that she did not choose the online environment no doubt contributed to her significantly negative attitude towards the experience, but she also described herself as a social learner, and a vocal person overall, who learns best in groups. Karen made frequent comments about her preferred way of learning and defined herself as a "traditional learner." One of the most important learning outcomes Karen felt she experienced from her online class was the appreciation and empathy she developed for students in her first grade class who have differing learning styles. "It helped me to be a better teacher in that I'm more understanding of my students who have learning differences."

Karen's point about learning differences is crucial for understanding student behavior and performance in the online learning environment. Her assessment of herself as a traditional learner may have inhibited her from taking full advantage of the affordances of the online medium. Throughout the think-aloud, Karen made comments such as the following. "I feel like there is probably an easier way to be doing this class than I'm doing it, but like I'm always doing it this way, where I'm not quite sure what we're supposed to be reading or doing." However, she also found ways to utilize the affordances to her advantage, such as the aforementioned strategy of reading student comments on a topic as if they were an advance organizer. She also noted that the ongoing nature of the student discourses would be useful if "you want to write a paper on that topic or something."

Had Karen been able to adapt her learning style to the online environment, she might have had a very unique learning experience, much like the one Ann quite unexpectedly had herself. Ann is also a student in a degree program on campus, but she works full time and takes only one other class. The on campus section of the course that she is taking online was offered on a different day than the other course she took on campus, and so rather than coming to campus two days per week, she decided to enroll in the online section of the course. Therefore, unlike Karen, the choice to take an on line course was a convenience, and so she may have entered the experience with a more positive attitude. Whereas Karen relied on the structure of the in class course, Ann found that structure too limiting, too linear. "I feel when you are in a class there are a lot of rules that people follow," for example, one person talks at a time, students don't interrupt each other, they follow the train of thought that the last person said. Furthermore, Ann described herself as shy in class, and she felt less inhibited online, whereas Karen described herself as a very vocal person, who felt she couldn't be heard online.

Ann adapted to the online experience in many ways. For example, technologically, she found innovative ways to work with multiple browser windows, which was a coping strategy used in the online chats so that she could

refer to her notes and the Professor's Website at the same time. Ann was particularly pleased with the online chat feature of her course, which proved to be the activity that transformed her learning experience and her beliefs about learning. Ann reported that the online learning class "broke me out of what I would normally say learning was in the regular classroom...I'm kind of doing a lot of it independently."

Another example of the independent nature of online learning is the asynchronous discussion board feature of her class. Ann noted that it was challenging to be on her own and required to write short-answer responses to thought-provoking questions: "I hadn't had anyone to talk to about those issues...it was me doing it on my own ...trying to come up with links between pieces." Making connections is something that was normally done in class, by the Professor, or by other students asking questions. Ann was willing to take risks in the course and with her own participation, which may have made all the difference in transforming the negative feeling of isolation into a positive feeling of independence.

The online class experience created many potentially frustrating tensions for the participants. The tensions arose not just from a lack of inexperience with the online medium, but also from the whole of the system itself. This assertion is evidenced in the data – poorly laid out course materials, collapse of time and space boundaries, the virtual nature of interaction, isolation – all of these elements contributed to the tensions the participants experienced.

Activity Theory

Activity theory provides a lens through which we may view the whole of the system and begin to understand, through analysis, the causes of the tensions reported in the findings. This analysis also makes possible the derivation of ideas for adjustments to the system that will result in the easing of these particular tensions. Activity theory has great potential for the refinement and efficacy of practice in any system -- educational, organizational or social.

Activity theory developed from the work of Soviet psychologists Vygotsky and Leont'ev, who were both greatly influenced by the philosophical writings of Marx and Engels (Engestrom, 1999). Activity theory constitutes an analytical framework that stresses the importance of a cultural-historical and dialectical approach to the understanding of human activity and societal or systemic change. Vygotsky (1978) articulated the need for a new approach to understanding human activity thusly:

> All stimulus-response methods share the inadequacy that Engels ascribes to naturalistic approaches to history. Both see the relation between human behavior and nature as unidirectionally reactive. My collaborators and I, however, believe that human behavior comes to have that 'transforming reaction on nature' which Engels attributed to tools. We must, then, seek methods adequate to our conception. In conjunction with new methods, we also need a new analytic framework (p.61).

These ideas were expanded upon by Leont'ev (1978) "...activity is not a reaction and not a totality of reactions but a system that has structure, its own internal transitions and transformations, its own development...In all of its distinctness, the activity of the human individual represents a system included in the system of relationships of society." (pp.50-51). The definition of human activity as a multi-directional, societally embedded, transformative system stands in direct contrast to the western notion of the autonomous individual, which is perhaps the reason why activity theory has only recently gained attention in the west. However, in the last two decades western educational researchers have begun to utilize activity theory as an analytical framework for understanding participant activity in educational and organizational settings.

Engestrom has led the way in adopting an activity theoretical approach to the analysis of such settings, and has contributed to the further development of the theory by creating a model of an activity system that can be readily applied by researchers. According to Engestrom and Miettinen (1999) "Minimum elements of this system include the object, subject, mediating artifacts (signs and tools), rules, community, and division of labor" (p.9). The last element of Engestrom's model is the outcome of the activity system. Barab (2001) notes "Activity theorists are not simply concerned with doing as disembodied action but are referring to doing to transform some object, with a focus on the contextualized activity of the system as a whole" (p. 2). In this clarification, the outcome is the transformed object. Barab (2001) continues:

> By subjects, activity theorists are referring to the individuals or groups whose agency is selected as the point of view for the analysis. Objects can be conceptual understandings, raw materials, or even problem

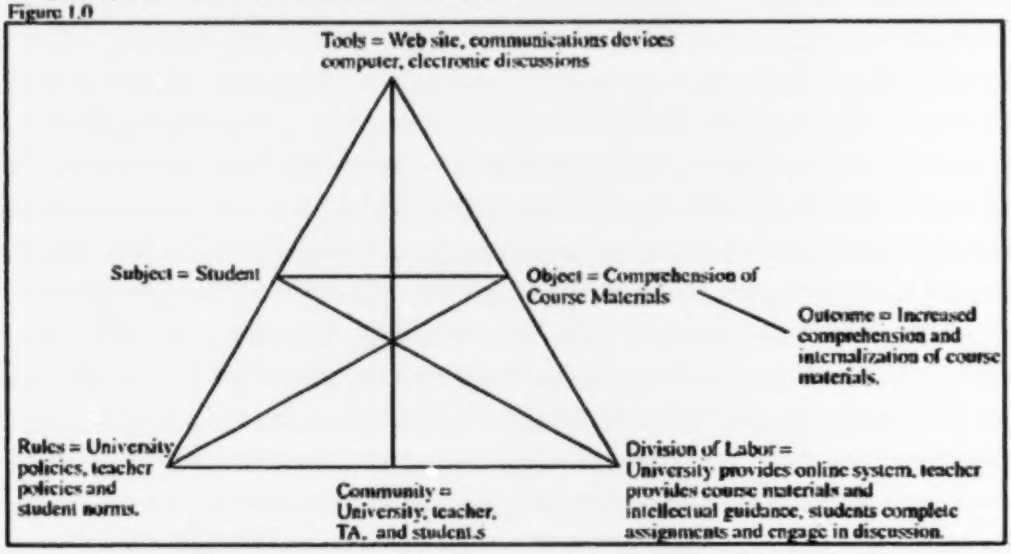
spaces 'at which the activity is directed and which is molded or transformed into outcomes with the help of physical and symbolic, external and internal tools.' (Engestrom, 1993, p. 67)" (p. 2).

The historicity of the activity system is an important concept in the analytical structure of activity theory. As Vygotsky (1978) notes "The psychological development of humans is part of the general historical development of our species and must be so understood." (p. 60). Engestrom (1999) defines the notion of historicity in the context of activity theory as "identifying the past cycles of the activity system." (p. 35).

Three principles govern the interpretation and analysis of data when a researcher takes an activity theoretical perspective: 1) the activity system as a whole is the unit of analysis; 2) the history of the activity system must be taken into account; and 3) contradictions within the activity system can be analyzed "as the source of disruption, innovation, change, and development of that system, including its individual participants" (Engestrom, 1993 p.65). The analysis of the participant's experience in the online class is based on these three principles.

The first task is defining the elements of this particular activity system. For the purposes of this paper, the student participant is the subject of the activity system. In a different analysis, the teacher could be taken as the subject, or the class as a whole could be taken as the subject. This shift in emphasis would necessarily produce different results; how significant this difference would be is unclear. With the teacher as the subject, both the object and the outcome would change; however, the rest of the elements of the system would remain the same. Therefore, this analysis, while significant to understanding the student's experience, does not attempt to tell the complete story of the class. Figure 1.0 details the activity system of the online class that Karen, Ann, Myriam and Jean participated in based on the student as the subject.

Figure 1.0


Tools = Web site, communications devices computer, electronic discussions
Subject = Student
Object = Comprehension of Course Materials
Outcome = Increased comprehension and internalization of course materials.
Rules = University policies, teacher policies and student norms.
Community = University, teacher, TA, and students
Division of Labor = University provides online system, teacher provides course materials and intellectual guidance, students complete assignments and engage in discussion.

Online education at Teachers College has existed for three years. The courses in which the students participated had very little history as online courses. In fact, both Karen and Ann were participating in courses that were given as an online course for the first time (Spring, 2001). Therefore, there is no direct online history for these particular activity systems; rather, the history is significantly linked to the traditional face-to-face classroom. The activity system for online education is quite similar to a traditional classroom activity system. The subject, object, community and outcome are the same for both. It is important to note that the historical experience of both the subject and the community in the online classroom is the face-to-face classroom. The expectations and actions of the members of the online classroom activity system have been conditioned by their experience in the traditional face-to-face classroom.

The offering of these courses online constitutes an expansion of the definition of the classroom activity system at the institutional level. A graduate level course at Teachers College is no longer necessarily geographically and temporally located. This expansion represents a historical shift at the institutional level with great consequences at the personal level. Engestrom (1999) discusses the significance of expansive cycles in the life of activity systems.

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> "'It is quite natural to endeavor to represent reproduction as *cycles* resulting in the formation of a new social structure on the basis of some preceding one' (Schedrovitskii, 1988, p.7; italics in the original). Such an irreversible time structure may be called an *expansive cycle* (Engestrom, 1987)...For the historical understanding of activity systems, expansive cycles are of crucial importance" (p. 33).

The new social structure emerging from the expansive cycle that has produced the online course is occurring at all levels of society, not just higher education. Castells (1994) defines this new social structure, "The control over knowledge and information decides who holds power in society. Technocrats are the new dominant class" (p. 41). Students capable of technically understanding the new classroom environment have an advantage over those who do not.

The expansion of the classroom activity system from face-to-face to virtual, coupled with the participant's historically based expectations combine to create the contradictions and tensions felt in the online class experience. Karen reported in the interview section that prior to coming to Teachers College she had very little experience with computers. "Before I came to Teachers College, I didn't even have e-mail and I didn't know what a web address was." Her expectation of the online class was that it would be similar to a "normal class." Karen's description of her learning experiences in the traditional face-to-face class was deeply grounded in the physical, geographic and temporal nature of that experience. The lack of these same features in the new system caused a great deal of distress for her and possibly impeded her intellectual growth. However, it is important to note that Karen found solutions to some of her problems through referring to the semiotic and concrete tool of the archived student discussions. This archive is a new feature of the activity system and it is a potentially rich source of learning within the new environment. The archive of the student discussion represents a new educational artifact that can be continually accessed and continually created. The externalization and dissemination of student thought is a significant innovation and an unparalleled educational tool integral to the new activity system which all of the participants took advantage of.

The design flaws that frustrated participants in the new activity system derive from the inexperience of the teachers in the new environment. In two of the courses, the teachers had never previously taught an online class and were not trained in the instructional design of educational technology. Therefore, errors in web-site architecture were made, including dating and labeling of material and the use of multiple URLs, which caused confusion for participants. The division of labor in the new activity system calls for technological knowledge and ability for all participants. Previously, content knowledge, administrative knowledge and a small amount of technological knowledge (word processor and copy machine functioning) were sufficient for efficacious teaching. In the new activity system we must add to this list the specific technological skills related to internet based communication (utilizing ftp, use of e-mail, web site architecture, understanding of hyper-linking, use of communications devices such as the discussion board and the chat room to name the most basic competencies); and teachers must give additional thought to design and layout of course materials and the facilitation of student participation.

The facilitation of student participation is related both to the division of labor and to rules in the new activity system. The rules for student participation revolved around posting to the discussion board. "I write something just so that I'm getting participation credit," lamented Karen. The new division of labor for the student includes not only the reading assignments and the essay assignments, but also weekly written participation in the discussion board. Karen continues, "sometimes in class [face-to-face] you don't always respond [to the discussion]...But I feel like in order to even know, for someone to know I was there, I need to [post to the discussion board]." This tension regarding the new rule of participation is a frustration for Karen, yet it is also a source of learning for her. Again we can note her use of the student discussion to scaffold learning and as a potential resource if one is writing a paper directly related to the topic of discussion.

Communicating with students requires attentiveness not only to the discourse on the discussion board, but also to individual e-mails sent to the Professor. Myriam's major disappointment in the online class was the lack of interaction with the teacher and the TA; "I send an e-mail and I don't know if they will answer or not, if they will reply or not and I regret that part." The new activity system requires a different type of time commitment from the teacher. Rather than holding office hours and a class each week, the teacher in the online environment must be ready to handle student questions and concerns at almost anytime. This is a daunting obstacle for the effective implementation of online education.

The degree of student agency afforded by the environment represents another shift in the division of labor and rule setting. In the new activity system, the community creates rules and norms through their actions. Therefore, the action of any individual within the community has authoritative potential. Those community members possessing the most facility and ease with the technological environment are potential rule makers and trendsetters in this environment. For instance, in Karen's class she noted that students seemed to post new

comments to the discussion board on Sunday. So, she made a point of going to the discussion board on Monday to read the new posts. Additionally, Ann noted that in the chat room, any one of the participants could initiate a topic of discussion; it is not dependent on the Professor or the TA. While this level of agency may be good for the community as a whole, there is an inherent danger of alienation for the less technically proficient community members.

This danger of alienation has serious implications for the outcome of the new activity system, which in this case is the comprehension and internalization of course materials. This danger inheres for students not only from the potential of the empowerment/alienation dynamic brought about by the new configuration of rule making and division of labor, but also in the poor layout of the course materials, and the virtual nature of the tools. Karen expresses her alienation and her perception of its effect on the activity system outcome "...it feels really artificial and it feels like I'm...more concerned, like I said about, just what I write and being grammatically correct than like truly learning and getting new ideas and becoming a better teacher which was my whole goal of coming here." This negative assessment of the achievement of the intended outcome by Karen was counterbalanced in the interview by her admission that the experience had produced a meaningful unintended outcome for her as a teacher. She states that the experience has made her a more "empathetic teacher." Through her own reflection on the difficulties she had, she realized that different learning styles contribute to student success and satisfaction in a given classroom experience; she is bringing this new understanding back to her first grade classroom.

Discussion

The activity theoretical perspective has revealed both strengths and weaknesses of the new activity system. Many of the tensions Karen mentions can be relieved through specific adjustments to elements of the system. For instance, the inexperience of the Professors in teaching online that led to the design flaws could be addressed by the University through a training and orientation program for them. Likewise, orientation sessions for the students could attenuate the prevalence of historically based classroom expectations and facilitate the acquisition of technical knowledge that would situate each student as a potential leader in the class.

The lack of visual cues to aid in the encoding of information could be addressed by the use of web cams, video teleconferencing may also address this specific issue. The negative effects of the virtual nature of the course (the sense of isolation), could be addressed through the use of synchronous chats and collaborative assignments designed to facilitate student interaction. These adjustments could substantially reduce the frustrations that may impede learning in the online classroom.

Activity theory as a framework for understanding student behavior and experience in the online classroom is extremely useful. The complexity of Engestrom's model allows for a thorough view of factors influencing the subject. The emphasis on historical perspective situates the analysis meaningfully in a broader societal context. Indeed, participant reports of their online experience makes most sense in light of their historically based expectation of the traditional face-to-face classroom. The participants are not alone in the holding of this expectation. Society at large is undergoing an expansive cycle of revolutionary proportions regarding technological advances. We do not yet understand the full implications of these developments. Our expectations and prognostications are based on what has gone before. It is only through careful investigation of these emerging processes that we will be able to understand and direct their significance and impact. Activity theory is a useful framework for such an effort.

Implications of key findings

This study was designed to provide qualitative information about the experience of the student in the online course. The four main themes that emerged from the transcripts, web site design flaws, cognitive and coping strategies, the effects of virtuality and learning differences reveal important aspects of this experience. As designers and instructors, we need to pay attention to these aspects and use them as a roadmap to improving the educational experience of the online student. This can only be done if students are given clear expectations about the course format and course contents at the outset. For example, Karen's experience of 'having' to go back and re-read messages from previous weeks' themes could have been turned into a learning strategy by emphasizing that the online environment is not supposed to follow the same schedule as the campus course. That the lessons are never really "done" or "complete" in an online environment is a new concept, but it should be one that is exciting and valuable to the learner. Students should also be aware that they are in important part of the learning process; just as they might eventually depend on other students for guidance or feedback, so those students depend on them for the same reasons. Adjusting student expectations is the work of the instructor. Designers' efforts should focus on

alleviating the negative effects of virtuality and in creating templates that directly support the instructor in developing clear layouts for the presentation and pacing of course materials.

Methodological considerations

Although we have many enlightening examples of how students behave in an online environment, due to the diversity of courses and web platforms used, it is possible that we were comparing apples with oranges. Therefore, the direct causal relationships—if there indeed were any—between inputs such as student disposition and course platform, and outputs in the form of student satisfaction and motivation to participate were unclear. Further research in this area might explore some of these causal relationships by selecting a more homogenous sample, such as students who participate in the same course, or students who are not currently taking on-campus courses.

Even if we were to repeat this study with a similar group of students, we would try to get more personal information from the students, such as their reasons for taking an online course, their reasons for coming to Teachers College, their aspirations and plans. Having additional information about their values and beliefs on and off campus would have provided us with more factors for analysis of their attitudes and behaviors online. Although most of the participants did compare some aspects of their behavior online to their behavior in class, it would have been interesting to compare their disposition in the online course with their typical disposition in class. Additionally, we might have asked these students what their expectations were before taking the online course and if these expectations changed at all.

This research project raised issues of importance in doing qualitative research based on non-traditional learning environments. For example, how does one observe someone's participation in a course, which typically takes place in isolation? Using the technique of videotaping and verbal protocol analysis may have been an adequate solution, but there is perhaps a better way that has yet to be discovered. Additionally, including in this way students who are located remotely would have been costly and impractical.

A final issue, that is not new to online learning, is how to actually measure learning outcomes. Karen, Ann, Jean, and Myriam all had unique learning experiences, and definitively more or less satisfying experiences, but did any one student actually learn more or less than the others? Did they perform more or less adequately? We can only hypothesize based on research experience with classroom learning techniques, but a more experimental, qualitative approach would have to be undertaken in order to say with certainty that different strategies or course design in the online environment really contributed to improved learning outcomes.

References

Anderson, J.R. (1995). Cognitive Psychology and its Implications (4th ed.). New York, NY: W.H. Freeman & Company.

Ausubel, D. P., Novak, J.D. & Hanesian, H. (1978). Educational psychology: A cognitive view (2nd ed.). New York: Holt, Rinehart and Wilson.

Barab, S. & Schatz, S. (2001). *Using Activity Theory to Conceptualize Online Community and Using Online Community to Conceptualize Activity Theory*. Paper given at the AERA 2001 Conference. http://inkido.indiana.edu/aera2001. April 18, 2001 10:00pm.

Castells, M., et. al. (1994). Critical Education in the New Information Age. New York, NY: Rowman & Littlefield Publishers, Inc.

Driscoll, M. P. (1994). Psychology of Learning for Instruction. Boston, MA: Allyn and Bacon.

Engestrom, Y. (1987). Learning by expanding: An activity-theoretical approach to developmental research. Helsinki: Orienta-Konsultit.

Engestrom, Y. (1993). *Developmental studies of work as a te:)ench of activity theory: The case of primary care medical practice*. In S. Chaiklin & J. Lave (Eds.), Understanding practice: Perspectives on activity and context (pp. 64-103). New York, NY: Cambridge University Press.

Engestrom, Y. (1999). *Activity theory and individual and social transformation*. In Y. Engestrom, R. Miettinen, & R-L Punamaki (Eds.), Perspectives on Activity Theory (pp. 19-38). New York, NY: Cambridge University Press.

Engestrom, Y. & Miettinen, R. (1999). *Activity theory: A well-kept secret*. In Y. Engestrom, R. Miettinen, & R-L Punamaki (Eds.), Perspectives on Activity Theory (pp. 19-38). New York, NY: Cambridge University Press.

Ericsson, K. A., & Simon, H.A. (1983). Protocol Analysis: Verbal Reports As Data. Cambridge, MA: The MIT Press.

Fiske, D.W. (1971). Measuring the concepts of personality. Chicago, IL: Aldine.

Harasim, L., *Computer Networking for Education*. In Plomp, T. and Ely, D. (eds.) International Encyclopedia of Educational Technology. Second Edition. (1996) Great Britain: Pergamon, p. 484-489.

Glaser, B. and Strauss, A. (1967) The discovery of grounded theory; strategies for qualitative research. Chicago: Aldine Pub. Co.

Leont'ev, A.N. (1978). Activity, Consciousness, and Personality. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Lockee, B B., Burton, J.K. & Cross, L.H. (1999). No Comparison: Distance Education Finds a New Use for 'No Significant Difference.' *Educational Technology Research and Development*, Vol. 47, no. 3, 33-42.

McIsaac, M.S., & Gunawardena, C.N. (1996). *Distance Education* in D.H. Jonassen (Ed.), Handbook of research for educational communications and technology (pp. 403-437). New York: Simon & Schuster MacMillan

Schedrovitskii, G.P. (1988). Basic principles of analyzing instruction and development from the perspective of the theory of activity. *Soviet Psychology*, XXVI(4), (pp. 5-41).

Sudman, S., & Bradburn, N.M. (1974). Response effects in surveys. Chicago, IL: Aldine.

Vygotsky, L.S. (1978). Mind in Society: The Development of Higher Psychological Processes. Cambridge, MA: Harvard University Press.

Weiss, C. H. (1975). Interviewing in evaluation research. In E. L. Struening & M. Guttentag (Eds.), *Handbook of evaluation research* (Vol. 1, pp. 355-395). Beverly Hills, CA: Sage.

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